27. Macropygia browni, Scl. P. Z. S. 1877, p. 110.

I am glad to receive a second example of this fine species from the Duke-of-York group.

Dr. Salvadori writes me that he suspects that *Turacœna crassirostris*, Gould (P. Z. S. 1856, p. 136), may be the young of *Macropygia browni*. I have examined Mr. Gould's typical specimen of the former species now in the British Museum; but although I believe it is, no doubt, the young of an allied species of *Macropygia*, I do not think it can belong to *M. browni*, as it is so much smaller in size.

29. Nyctocorax caledonicus (Gm.); Gould, Handb. B. Austr. ii. p. 311.

An adult of this Night-Heron from the Duke-of-York group is marked:—"Irides yellow; legs dusky reddish pink; bare space about eyes lavender.—G. B."

30. Megapodius eremita.

Megapodius eremita, Hartl. P. Z. S. 1867, p. 830.

M. hueskeri, Cab. et Reich. J. f. O. 1876, p. 326; Scl. P. Z. S. 1877, p. 113.

M. rubrifrons, Scl. P. Z. S. 1877, p. 556.

Prof. Salvadori has recently examined the typical specimens of *M. eremita* from the Echiquier Islands, *M. hueskeri* from New Hanover, and *M. rubrifrons* from Admiralty Island, and pronounces them to be identical.

3. On the Male Generative Organs of *Chlamydophorus truncatus* and *Dasypus sexcinctus*. By M. Watson, M.D., Professor of Anatomy, Owens College, Manchester.

[Received June 11, 1878.]

(Plate XLIII.)

1. Chlamydophorus truncatus.

The anatomy of *Chlamydophorus truncatus* has formed the subject of elaborate monographs by Hyrtl[1], Macalister[2], and others[3]; and little remains to be said regarding such parts of the animal as have been fully investigated by these anatomists. On looking over their essays, however, I find that, with regard to the male generative organs, we possess almost no reliable information. Professor Hyrtl's specimen was a female; and although that anatomized by Professor Macalister was of the opposite sex, his reference to the male organs is sufficiently meagre to justify me in giving a detailed description of these from two male specimens of this rare mammal which have lately come into my hands.

[1] Denkschriften der kais. Akad. Wien, ix. 1855.
[2] Trans. Roy. Irish Acad. 1875, p. 219.
[3] Harlan, Lond. Zool. Journ. 1825; Atkinson, Journ. of Anatomy, vol. v.

The specimen measured $4\frac{1}{2}$ inches in length, exclusive of the tail.

Penis.—The penis is large for the size of the animal, and, so far as one can judge from the examination of specimens preserved in alcohol, appears, in the natural condition, to be strongly curved, the convexity of the curve being directed forward, whilst the extremity of the penis is directed downward and backward toward the anus. The organ is slender, and tapers gradually from base to apex, measuring $\frac{5}{8}$ of an inch in length and $\frac{1}{16}$ of an inch in diameter. The base is surrounded by a small prepuce consisting of little more than a narrow ring of integument, and is entirely destitute of a frenum præputii. The presence of two powerful retractores penis, however, justifies us in concluding that in the *Chlamydophorus*, as in *Dasypus sexcinctus*, the penis is, in the flaccid condition, retracted within this apparently rudimentary prepuce. The intermediate portion of the penis presents an appearance of irregularly disposed circular constrictions, apparently due to the annulated character of the integument, and corresponding exactly to that described below in the six-banded Armadillo. The glans penis is not distinguishable as a separate portion from the rest of the organ; and the absence of it, together with that of the bulb, would appear to indicate that a corpus spongiosum is altogether wanting, as it apparently is in the Armadillo, the penis in that animal being formed exclusively by the two corpora cavernosa. I could not distinguish any patch of transverse ridges on the ventral aspect of the organ, such as is seen in that of *Dasypus sexcinctus*; but the small size of the parts, combined with their immersion in alcohol, may have obliterated these (under any circumstances) very minute elevations.

Internal Organs.

Kidney.—The kidneys are large in comparison with the size of the animal, and are situated in the lumbar region. Each is almost globular in form, measuring $\frac{3}{8}$ of an inch in length and $\frac{2}{8}$ in breadth, and is surmounted by a suprarenal capsule of large size and pyramidal form. The ureter measures $\frac{9}{16}$ of an inch in length, and enters the bladder close to the orifice of the urethra, being crossed on its inner side from before backward by the corresponding vas deferens.

Bladder.—The bladder, globular in form, small, and provided with walls of considerable thickness, lies altogether in front of the transverse ligament which unites the two pubic bones together, and which corresponds in position to the pubic portion of the brim of the pelvis in the majority of mammals. The viscus is partly invested by peritoneum, which forms a well-marked inferior ligament attaching it to the middle line of the anterior abdominal wall. In the specimen examined the bladder was contracted, and measured $\frac{1}{4}$ of an inch in length and the same in greatest breadth. The urethral orifice is on a level with the base of the viscus.

Urethra.—The urethra is divisible into two portions—an intrapelvic or muscular, and an extrapelvic or spongy portion. The intrapelvic portion, from the neck of the bladder to the point of entrance of the Cowperian ducts, measures $\frac{3}{16}$ of an inch in length. Its

walls are thick, being surrounded by a layer of circularly disposed muscular fibres. Resting upon the upper surface of the proximal half of this portion of the urethra is the prostate gland, the posterior border of which is attached to the tube. On slitting open the canal, no trace of a vesicula prostatica could be distinguished; but it is well to bear in mind that the small size of the parts, together with the immersion of these for some time in alcohol, may have served to prevent the recognition of what, under any circumstances, must be a very minute organ. Professor Macalister[1] refers to the presence of a Weberian organ, of which, however, he gives no description, merely stating that it is "long, and not distinctly bifid;" but inasmuch as he makes no mention of a prostate gland, it appears to me to be not improbable that he may have mistaken that gland for the organ in question, an error which need occasion no surprise when the small size of the parts is taken into consideration. If the Weberian organ be present, it certainly does not project beyond the wall of the urethra. The extrapelvic or spongy portion of the urethra lies within the penis and measures $\frac{7}{8}$ of an inch in length. At its commencement it receives the ducts of Cowper's glands, whilst at its termination it opens upon the summit of the rounded extremity of the penis.

Testicles and vasa deferentia.—Professor Macalister[2] states that the testicles lie within the "wide abdominal ends of the inguinal canals;" but this was certainly not the case in my specimen. In it the testicles were situated immediately posterior to the kidneys, and in close relation to the superior abdominal wall, to which each was closely attached through the reflection of the peritoneum. The testicle of the right side was posterior in position to that of the left. The gland itself was of the same size and form as a canary-seed, and, together with the epididymis, measured $\frac{1}{4}$ of an inch in length. The latter was of large size as compared with the testicle, to the outer side of which it was attached at both its anterior and posterior extremities. The anterior extremity, or globus major, is continuous with the testicle, the separation between them being indicated by a slight constriction. From this it passes forward for $\frac{1}{16}$ of an inch, and, suddenly curving upon itself, turns backward to the same extent, and becomes constricted to form the body of the epididymis. The latter extends along the outer side of the testicle as far as its posterior extremity, where it again expands into a glandular mass, or globus minor, which, however, is of larger size than both limbs together of the globus major. From this body the vas deferens passes off. The entire testicular mass is placed obliquely, its anterior extremity being directed obliquely forward and outward, the posterior, which is in contact with the lateral aspect of the apex of the bladder, in the opposite direction. The vas deferens measures $\frac{1}{8}$ of an inch in length, and crosses the ureter in its course backward. The two vasa at their termination are almost in contact, and disappear from view by sinking into the anterior border of the prostate gland, the substance of which they traverse in their course to the

[1] *Loc. cit.* [2] *Loc. cit.*

urethra. As Professor Macalister observes, the vasa are not convoluted, neither do they present any trace of lateral diverticula or vesiculæ seminales.

Prostate gland is well developed, and forms a quadrilateral mass of lobulated glandular tissue lying upon the upper surface of the intrapelvic urethra. It measures $\frac{1}{8}$ of an inch in length, and the same in breadth, and is attached by its posterior border to the urethra, its anterior border, which is free, extending between the vesical openings of the ureters. The vasa deferentia sink into the latter in their course to the urethra. Prof. Macalister does not refer to this gland.

Cowper's glands.—These, which are not mentioned by Macalister, are two in number. Each lies in close relation to, and slightly under cover of, the inner side of the crus penis. They are regularly pyriform; and each measurss $\frac{1}{16}$ of an inch in length. Their ducts pass forward, and open at once into the commencement of the spongy portion of the urethra.

Penis.—The penis is formed by the junction of the two crura exclusively, the third element or corpus spongiosum being entirely absent. The crus penis of each side is attached to the ramus of the ischium, as well as to the posterior half of the free border of the pubic bone, the latter bone not uniting with its fellow of the opposite side. Each measures $\frac{1}{2}$ an inch in length, and lies along the inner side of the adductor muscle of the thigh. The two crura unite opposite the anterior border of the pubic bones, and together form, as it were, a bridge, underneath which the rectum passes backward to the anus. In consequence of the absence of a corpus spongiosum, the penis is devoid of both bulb and glans. The penis itself measures $\frac{7}{8}$ of an inch in length, of which the basal $\frac{3}{8}$ are concealed by the integument, the remainder being free.

Muscles of penis.—Of these there are three on each side of the middle line:—(1) The *ischio-cavernosus* is strong and covers the crus. Its fibres are attached posteriorly to the ischium, whilst anteriorly they are inserted into the crus behind the junction of the latter with its fellow. A small portion of the crus between this and the next muscle is uncovered by muscular fibres. (2) *Bulbo-cavernosi.* These two muscles are apparently continuous across the middle line, and together form an investment of transversely arranged muscular fibres which covers the lower surface of the basal portion of the penis. No median raphé could be distinguished between them. (3) *Retractores penis.* These are placed on the dorsal aspect of the organ. Each is a delicate riband-like muscle which, arising from the upper wall of the pelvic cavity, crosses the outer side of the depressor caudæ muscle, and passing down parallel to the crus penis, and along the dorsal aspect of that organ, is inserted into the corpus cavernosum immediately behind the tip of the penis. These muscles doubtless act in the same manner as in *Dasypus*, and serve to retract the penis within the rudimentary prepuce. Beyond the statement that the crus penis is invested by muscular fibres, Prof. Macalister gives no account of the muscles just described.

2. Dasypus sexcinctus.

If now we compare the male organs of *Chlamydophorus* with those of *Dasypus sexcinctus*, we shall find that the resemblance between them is very striking. A full description of the male organs of *D. sexcinctus* after that already given of those of *Chlamydophorus truncatus* would be superfluous, seeing that the one would to a large extent be a mere repetition of the other; and I shall therefore confine myself to the indication of some points of interest in the anatomy of *Dasypus* which appear to have been overlooked[1]. The penis is enormous, and in a specimen measuring 13 inches in length, exclusive of the tail, is 4 inches long. It closely resembles that of *Chlamydophorus* in form, its extremity being simple and not bifid as in the allied genus *Tatusia*. The integumental covering of the penis is annulated in character, the annulation extending from the base to the extremity of the organ on its dorsal or abdominal aspect, but interrupted on its lower surface toward the tip of the organ by a cutaneous patch presenting an altogether different appearance. This patch, which is situated immediately behind the extremity of the penis, is oval in form, and measures $1\frac{1}{4}$ inch in length. It surface is characterized by the presence of numerous closely placed transverse ridges of a hard and corneous nature. These ridges give to the patch somewhat of the appearance of a fine file, and, in the absence of a distinct glans, in all probability fulfil the function of the recurved spines so frequently seen on the latter in many mammals. The prepuce is very small, and, when the penis is fully extended, disappears entirely, being stretched so as to form the cutaneous covering of the latter. In the flaccid condition, however, and when the organ is retracted, the penis is withdrawn entirely within the prepuce and almost concealed from view. Improbable as it may appear that an organ of the length of the penis can be really retracted within so small a prepuce, I am in a position to know that such is the case, having examined two specimens, in one of which the penis was exserted, as in fig. 4, whilst in the other it occupied the position shown in fig. 5. The retraction is accomplished by two retractor muscles, which, arising from the lower surface and outer border of the sacrum, pass forward along the whole length of the dorsum penis even to the tip, fibres being inserted into every part of that surface. These muscles, which exactly repeat those of *Chlamydophorus*, when contracting, have the effect of throwing the penis into a series of spiral curves, its extremity being bent inwards, as shown in fig. 5, so as to complete the concealment of the organ under its sheath. That these muscles are really the agents in producing this retraction is proved by the fact that the *concavity* of the terminal curve of the penis is formed by the *dorsal* aspect of the organ, on which these muscles are placed, whilst the *convexity* of the curve is formed by its *ventral* surface which is readily distinguished by the presence of the file-like patch already referred to. The penis is formed, as in *Chlamydophorus*,

[1] I have been unable to consult Prof. Alexandrini's monograph of *Dasypus*, in Mem. Accad. d. Sci. Bologna, tom. vii. 1856.

by the junction of the two crura alone, and possesses neither bulb nor glans. With regard to the other muscles of the penis, these closely resemble those already described in *Chlamydophorus*, with this difference, that the single mass formed by the bulbo-cavernosi muscles in the latter are here represented by two distinct and powerful fleshy bands which envelop the under surface of each crus previous to its junction with its fellow. The testicle differs in position in *Dasypus* from that which it occupies in *Chlamydophorus*, being attached to the inguinal region of the *anterior* abdominal wall in the former, whilst in the latter it lies behind the kidney. The globus major in *Dasypus* is closely applied to the anterior extremity of the testicle, and does not form the loop-like arrangement seen in *Chlamydophorus*. The vasa deferentia in both are non-convoluted; nor is there any trace of vesiculæ seminales in either. In both, a prostate and Cowper's glands are present, the former being traversed by the vasa deferentia in their course to the urethra, whilst the latter, although occupying the same position, are relatively considerably smaller in *Dasypus* than in *Chlamydophorus*. The bladder and urethra are similar in both genera, the only difference being that the walls of the intrapelvic portion of the latter are much more muscular in *Chlamydophorus* than in *Dasypus*, and that in the latter a well-marked caput gallinaginis, of a pyramidal form, is present, which is not represented in the former. In neither is there any trace of a vesicula prostatica.

It will thus be seen that in respect of the male sexual organs the resemblance between *Chlamydophorus* and *Dasypus sexcinctus* is very striking—a resemblance which, in respect of other organs, has been already pointed out by Prof Garrod[1]. As shown by that anatomist, *Chlamydophorus* agrees also with *Tolypeutes* and *Xenurus* in the absence of vesiculæ seminales and the simple condition of the glans penis, in both of which respects it differs from *Tatusia*. The presence of Cowper's glands constitutes a further element of agreement between *Chlamydophorus* on the one hand, and *Dasypus* and *Xenurus* on the other. These glands are also present, according to Dr. Murie[2], in *Tolypeutes*; but whether in *Tatusia* I cannot say, as with regard to the latter we possess no precise information. So far, then, as the observations above recorded go, they tend to strengthen the conclusions already arrived at by Mr. Garrod upon other grounds with regard to the close relationship which exists between *Chlamydophorus* and *Dasypus*. Professor Macalister, as the result of his elaborate investigation into the muscular anatomy of the Edentata, arrives at the conclusion that "the position of *Chlamydophorus* will be seen ..... to be plainly among the Dasypodidæ, and very close to *Tatusia*." The arrangement, however, of the sexual organs, including the nipples, together with that of the alimentary canal, which in *Dasypus* and *Chlamydophorus* is provided with two colic cæca, these last being absent in the other genera above referred to[3], appear rather to point to a closer relationship between *Chla-*

[1] P. Z. S. 1878, p. 222.
[2] Trans. Linn. Soc. vol. xxx.
[3] See Prof. Garrod's paper.

mydophorus and *Dasypus* than between *Chlamydophorus* and *Tatusia*.

I am indebted to Dr. Young for the preparation of the accompanying illustrations.

EXPLANATION OF PLATE XLIII.

Fig. 1. Male generative and urinary organs of *Chlamydophorus truncatus*, seen from the front. From above downwards are seen the suprarenal capsules, the kidneys and ureters, the testicles, the bladder and urethra, and the penis. The penis is hooked back to show the retractor muscles on its dorsal aspect.

2. Male organs of *Chlamydophorus truncatus*, perineal view. From above downwards are seen:—the penis, its basal portion being covered by the fibres of the bulbo-cavernosi muscles; below this the Cowperian glands lying in the interspace between the crura penis, these last being covered by the fibres of the ischio-cavernosi muscles.

3. Male organs of *Chlamydophorus* dissected, and seen from behind. K, kidney and suprarenal capsule; T, testicle; P, prostate gland; C, Cowper's gland; *Pe*, penis; *C p*, crus penis.

4. Penis of *Dasypus sexcinctus*, showing the file-like structure on the lower aspect of its extremity.

5. Penis of *Dasypus sexcinctus* retracted within the prepuce.

4. Note on Points in the Anatomy of Levaillant's Darter (*Plotus levaillanti*). By A. H. Garrod, M.A., F.R.S.

[Received June 14, 1878.]

In a former communication[1] I had the opportunity of bringing before the Society several facts with reference to the anatomy of *Plotus anhinga*, and of confirming Mr. Macgillivray's account of its most peculiar proventriculus. Several specimens of the species have since passed through my hands which differ in no way from that first described.

On the 9th of March last the Society obtained for the first time, by purchase, a male specimen of Levaillant's Darter (*Plotus levaillanti*) from Senegal. It unfortunately died on the 7th of this month (May) from peritonitis, the result of a perforating ulcer in the stomach.

The severity of the peritonitis caused all the abdominal viscera to be agglutinated into a single mass, and rendered them particularly soft. Nevertheless I was able to disentangle most of the alimentary canal for examination; and it has proved of more than ordinary interest, as the following description will serve to show.

The tongue, as a free organ, is obsolete. The œsophagus is capacious, without any crop. The œsophageal epithelium ceases abruptly by a transverse line where the gastric portion of the canal commences, below which it is replaced by the tough yellow epithelium so characteristic of the situation.

The proventriculus is composed of two circular areas of deep glands, which latter are of considerable size and do not come into con-

[1] P. Z. S. 1876, p. 335.